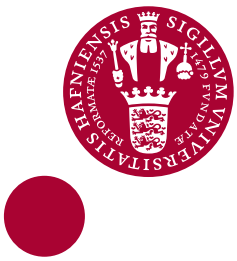

# Organic food and farming

## a pro-poor model for smallholder inclusion in developing countries

Kledal, Paul Rye

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# ICROFS news

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Newsletter from the International Centre for Research in Organic Food Systems


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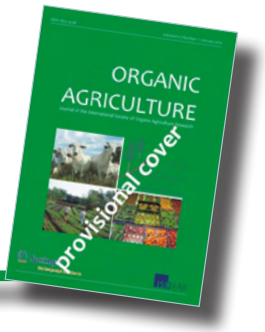





ICROFS
International Centre for Research in Organic Food Systems


# Next national research programme is under way

**Your input to *ICROFSnews***

We listen to our readers's response with pleasure, as we are here for you!
Therefore, any responses are more than welcome, be it about the new format, suggestions to improvements, changes, content or anything you can think of.

Contact us at: simon.rebsdorf@icrofs.org

### ØkoForskPLUS: Next call is under preparation

ICROFS' national Programme Commitee works continuously on the preparation of the call text for the next national research programme on organic food systems, ØkoForskPLUS.

The committee met in late January and will meet again two times in spring 2010 to complete the formulation of the call for applications for the next research programme. ØkoForskPLUS is thought of as a continuation of the whole research effort that has been made in the three research programmes, DARCOF I-III (DARCOF III runs out in 2010).

The programme focuses on a strategy for the Danish organic research, but with a strengthened synergy from international collaboration.

A new future research programme can further develop organic agriculture to play a still more important role in fulfilling political goals of creating a synergy between a market-based and growth-oriented food production. At the same time, the programme will meet the green objectives of bio-diversity, pesticides, water protection, and climate.

Read more about the current research programme, DARCOF III:
www.icrofs.org/darcofiii

## CORE organic

### CORE Organic II kick-off meeting

The partners of CORE Organic I have expanded their network and successfully developed a second ERA-NET, CORE Organic II, which will be a collaboration between 27 partners in 22 countries. The kick-off meeting takes place in Bern on April 14-15.

Read more about CORE Organic Funding Body Network: www.icrofs.org/coreorganic.

Back in 2007, the first CORE Organic ERA-NET succesfully ended. The final scientific report is now available and gives details on the activities and achievements of the project: www.coreorganic.org.

CORE Organic launched 8 pilot projects - running until 2010. These projects have each their own webside: www.coreorganic.org/research.

### CERTCOST workshop at BioFach

The latest results from the EU project CERTCOST was disseminated at the World Organic Fair, BioFach 2010. Partners from the European project presented research results on organic certification and costs.

Read more at www.certcost.org.

### New organic EU logo

Almost 130,000 people have voted online to choose the new organic symbol from three finalists. The winning logo depicts a light green leaf drawn by a number of EU stars. This new organic logo is going to label all organic products produced in the EU.

Read more about the new logo at www.certcost.org

### Subscribe to ICROFS RSS feeds

ICROFS has revived the RSS newsfeed service for researchers and stakeholders of organic agriculture interested in news from ICROFS.

Subscription is very simple. Just click the "RSS" link in the top right corner of www.icrofs.org. Then click "view feed XML" and you can choose MS Outlook to handle your RSS feeds automatically in the future.

### PhD defense: Meta-analysis of variety mixtures

Lars P. Kiær is defending his PhD thesis entitled:

*Meta-analysis of variety mixtures. Cereal crop interactions inferred from field trial data.*

#### Short summary of PhD thesis

Grain yields of cereal crops are often observed to increase when plants of different varieties are grown in mixed stand (variety mixtures), as compared to growth in pure stands. However, this mixing effect on grain yield varies widely and is sometimes seen to be negative. The general hypothesis of higher grain yields in cereal variety mixtures was confirmed here, for the first time, by means of meta-analysis.

Meta-analysis is a statistical approach in which previously published results can be combined, thus utilizing information from many different experiments and potentially determining the relative importance of various experimental conditions. Relative grain yield effects in variety mixtures were found to vary significantly between mixtures and between the crop types winter barley, spring barley, winter wheat and spring wheat. Furthermore, mixing effect was related to factors such as the number of varieties in the mixture and the diversity in grain yields of these varieties.

A recent ICROFS-project (BAR-OF, 2002-2005; www.darcof.dk/research/darcofii/vi2.html) included field trials with barley variety mixtures. Data from these were used to investigate the relative importance of specific variety and mixture characteristics. One of the mixtures out-yielded, overall, the best component variety in each trial.

Meta-analysis is widely applied in medicine but only rarely used for testing agricultural hypotheses. Results from field trials represent a distinctive type of data structure. Some problems and solutions addressing these structural considerations were discussed and investigated in a simulation study.

**About the PhD defense**
Lars Pødenphant Kiær

Friday 26. February 1.00 pm

Aud. 1-15 at LIFE, University of Copenhagen

Main supervisor: Professor Ib M. Skovgaard
Co-supervisor: Professor Hanne Østergaard

Assessment committee:
Assoc. prof. Christian Ritz (chair)
Fachgebietsleiterin Prof. Dr. Maria R. Finckh
Senior scientist Kristian M. Kristensen

Article

# Strip cropping system for sustainable food and energy production

By Henrik Hauggaard-Nielsen, senior scientist, Risø National Laboratory for Sustainable Energy Biosystems Division, Technical University of Denmark

**Strip cropping is a strategy subdividing single fields into strips. The present study combined annuals and perennials but no additional yield was found. This article discusses the need for capitalizing functions like $N_2$-fixation and soil carbon storage.**

Using traditional market pricing (produce weight) in the present study combining annuals and perennials, no additional yield was found.

In this article, the need for capitalizing additional ecosystem functions like $N_2$-fixation and soil carbon storage is discussed.

## Organic farming and bioenergy

In the context of enhanced integrity of Organic Agriculture (OA) it is important to reduce the reliance on fossil fuels. However, a key question is whether it is possible to keep up food production, introduce production of biomass for bioenergy and on the same time maintain soil fertility.

Organic plant production is based on healthy rotations, but crops are typically sole cropped in large fields (except for pastures), with a tendency to increase individual field sizes (ref. 1). Thus, more emphasis on practices including rotational principles of dissimilar types of crops grown in sequential seasons might be needed to ensure food security and to address the problems of soil degradation coupled with increasingly variable climatic conditions (ref. 4). In the BioConcens project a strip cropping system was designed and tested to be used for biomass production for food and bioenergy, while at the same time safeguarding soil fertility.

## Strip cropping

Strip intercropping is defined as the production of two or more crops within the same field in strips wide enough that each can be managed independently by existing machinery; yet narrow enough that the strip components can interact. It is practiced with success by e.g. several U.S. farmers. The motivation for a group of farmers in Iowa was greater net profit stability due to less soil erosion lowering general nutrient emissions, weed management aspects and less diseases and pests (ref. 2).

Strip cropping is like any other intercropping strategy based on the management of plant interactions to maximize growth and productivity caused by efficient use of plant growth resources such as light, water and nutrients (ref. 3). In the BioConcens project, an annual strip consisting of either winter rye + vetch or maize was grown beside a soil fertility building (SFB) strip of perennial grass-clover.

## Field experimentation

Field experiments were conducted at KU Life, Denmark (Tåstrup, 55°40′N, 12°18′E) in 2007-2008 and 2008-2009.

Early September seedbed preparation for the annual crops were established by 6m rotavation machinery within an already established 1-y grass-clover sward giving a 6m annual crop x 6m perennial crop system. Winter rye + vetch and green rye (before maize) were sown medio September. Maize was sown early May after harvest of green rye (silaging) and rotavation. Winter rye + vetch were harvested early August and maize in medio October.

## Winter rye – vetch yields

In both growing seasons the grass-clover strip revealed a comprehensive competitive strength towards winter rye + vetch grown in close proximity (0-25 cm) reducing the yield of the annual strip significantly (Fig.1).

Especially rye was limited in its growth, as compared to vetch, possibly indicating increasing competition towards soil N resources in the interface between the two strips – when taking into account vetch unique ability to fix atmospheric dinitrogen in symbiosis with root nodule bacteria. In contrast to rye+vetch grass-clover increased the dry matter production with about 10%.

## Maize yields

Maize (Fig. 2) and winter rye + vetch (Fig. 1) are yielding approximately the



*Photo 1: Seed bed preparation (a; ©geography.cst.cmich.edu.jpg) and individual strip sowing pattern according to the actual landscape (b; © www.macalester.edu.jpg)*

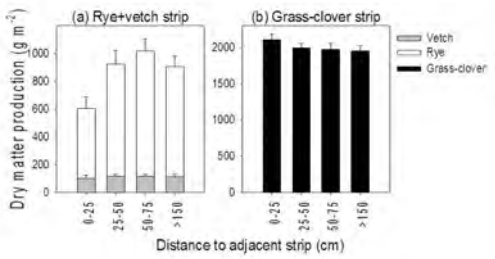


***Figure 1**. Total aboveground dry matter production during two subsequent growing seasons going from September to August, comparing annual winter rye + vetch (a) and perennial grass-clover (b) when grown with increasing distance to the adjacent strip. Values are the mean (n=8) ± SE*

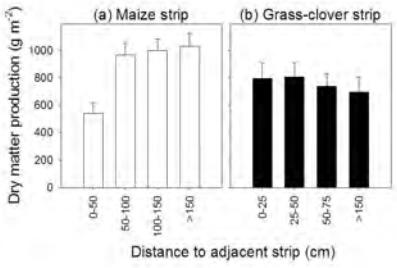


***Figure 2**. Total aboveground dry matter production during two subsequent growing seasons going from May to October, comparing annual maize (a) and perennial grass-clover (b) when grown with increasing distance to the adjacent strip. Values are the mean (n=8) ± SE*

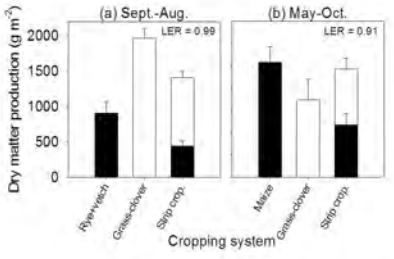


***Figure 3**. Total aboveground dry matter production during the two subsequent growing seasons comparing traditional cropping strategy of winter rye + vetch (a) and maize (b) as compared to strip cropping – evaluated by the use of LER (Land Equivalent Ratio) defined as the relative land area that is required to produce the yields achieved from strip cropping: LER values > 1 indicate an advantage in term of the use of environmental resources for plant growth. Values are the mean (n=8) ± SE*

The project is funded by the Danish Ministry of Food, Agriculture and Fisheries

same, but maize is only occupying the field area from May to October as compared to from September to August. Grass-clover yields illustrate these temporal differences, with 3-4 cuts included in the maize system as compared to 6 cuts in the rye + vetch system almost doubling the yield. However, before sowing maize green rye yielded between 100-200 g m-2 which in principal should be added to the maize system yields. Nevertheless the same annual crop effects were found in maize as compared to rye + vetch, with a yield decline of almost 50% when grown in close proximity (0-50 cm) to grass-clover. However, there was no added grass-clover yield when grown in close proximity to maize.

## Strip cropping yield evaluation

When including negative and/or positive yield effects in the interfaces between strips (Fig. 1; Fig. 2) more or less the same biomass was produced when dividing the field into strips (6x6m) as compared to growing the same area with 50% annual crop + 50% perennial crop. Especially, the interspecific competitive ability of grass-clover during the initial growth stages reduces the final annual yields significantly. So, why bother changing the well-known sole cropping practices? It is believed that the success of this strip cropping system requires inclusion of additional ecosystems functions and service not necessarily pictured using traditional agronomic market pricing based upon weight of produce.

## Additional functions and service

Ecosystem functions like leguminous $N_2$-fixation and the capacity of e.g. perennial grass-clover to act as carbon sinks should gain more attention when addressing climate change mitigation tools within the framework of OA principles and values. Furthermore, the value of subdividing fields into strips to avoid the build up of pathogens and pests, depletion of soil nutrients and to improve soil structure and fertility by e.g. alternating deep-rooted and shallow-rooted plants needs further research.

### Read more

Find more information about the DARCOF III research project BioConsens on the webpages:

- www.icrofs.org/Pages/Research/darcofIII_bioconcens.html
- www.bioconcens.elr.dk

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*Photo 2: Winter rye + vetch (a) and maize (b) annual crops combined with perennial grass-clover in 6x6m strip cropping system (©hnie@risoe.dtu.dk)*

# Organic farming systems benefit biodiversity and natural pest regulation in white cabbage



By Nicolai V. Meyling, Søren Navntoft and Jørgen Eilenberg, Department of Agriculture and Ecology, Faculty of Life Sciences, University of Copenhagen

**Natural regulation of cabbage root flies works well in experimental organic cropping systems of white cabbage. Low input and complex organic systems benefit functional biodiversity by providing good living conditions to several groups of natural enemies. Intercropped green manure benefits large predators while small predatory beetles favour low input organic systems with bare soil between crop rows.**

## The experimental organic farming system

Organic farming systems include enhancement of the natural regulation of insect pests. The organic farmer has little choice as conventional chemical pesticides are prohibited. In high value crops such as vegetables only low levels of crop damage is tolerated. Therefore, organic vegetable cropping systems must provide good living conditions for natural enemies (predators, parasitoids and insect pathogens) and rely on efficient natural regulation mechanisms.

In the ICROFS project VegQure (www.vegqure.elr.dk) vegetables (white cabbage, carrots, onions and lettuce) were grown under four different farming regimes:

- C1: Conventional vegetable cropping system (conventionally farmed control)
- O1: Organic farming in compliance with Danish regulations, dependent on external input
- O2: Organic farming with low input, green manure and nutrient cycling
- O3: Organic farming with low input, green manure, nutrient cycling and intercropping between crop rows

The O3 system is unique by adding structural diversity to the cropping system. This is done by leaving strips of the green manure from the previous year as intercrop between crop rows. The three organic cropping systems therefore range from simple to complex with decreasing reliance on external input.

In VegQure we have over several years studied the effects of these four farming systems on populations of selected pest insects and ground living predators in the experimental plots with white cabbage. This focus enables us to study the outcome of natural regulations of pests over time and evaluate how each farming system provides living conditions for natural enemies.

| Farming system | May 2007 | May 2008 |
|---|---|---|
| C1 | 25-30 | 25-30 |
| O1 | 5-10 | 25-30 |
| O2 | 5-10 | 10-15 |
| O3 | >70 | 50 |

*Table 1. Percent traps with large ground predator species in experimental plots with white cabbage*

## Regulation of cabbage root flies

During three field seasons, 2007, 2008 and 2009 we monitored the population dynamics of one of the major pests in white cabbage, the cabbage root fly (Delia radicum). In Denmark, the root fly generally has two generations per year. Eggs of the first generation are laid at the time when cabbage seedlings are planted while second generation flies lay their eggs in July-August. We monitored the eggs present in soil samples collected around the plants in 2007 - 2009.

In all years, the numbers of eggs per cabbage plant for first generation flies were relatively stable (15-20 eggs per plant) except for system O3. Here, levels decreased to one third compared to the other three systems over these three years. For the second generation, most eggs were laid in system O3 in 2007 (185 eggs per plant), in 2008 there were no differences in egg numbers between the systems (80-90 eggs per plant), and in 2009 significantly fewer eggs were laid in system O3 (35 eggs per plant). Overall, the numbers of eggs laid per plant decreased over the three year period by a factor 1.7 per year, but most prominently so in O3 with a factor 2.3 decrease in egg numbers per year.

Larvae hatching from the eggs live in the soil and feed on the cabbage roots. Pupation also occurs in the soil; offspring of first generation flies will emerge as second generation flies in July and their offspring mostly overwinter in the soil around the food plant.

The overall numbers of overwintering pupae of root flies decreased in the experimental plots over the study period, but we found two to three times as many overwintering pupae in system C1 compared to the three organic systems. As no more eggs were laid here than in the organic systems, we conclude that survival and resulting pupation success in C1 was higher than in the organic systems. Thus, natural regulation mechanisms function better in the three organic systems than in the conventional C1 system. One factor accounting for the differences in cabbage root fly survival could be predation by natural enemies.

## Farming systems affect natural enemy diversity

It is known that ground dwelling predatory beetles consume significant proportions of fly eggs just after the eggs are laid. We therefore trapped predators that were active on the soil surface while the flies laid their eggs in 2007 and 2008. Trapping was done by placing pit-falls in between the cabbage rows. The egg predators are small species less than 8 mm in length, and they can access cracks and

*Photo 1: Organically farmed plots with cabbages planted between intercrop rows of previous year's green manure showed high benefit for large ground dwelling predators.*

*Photo 2: Ground dwelling predators were monitored in experimental cabbage plots by pit-fall trapping. A trap is placed in the foreground of the picture.*

*Photo 3: The low input organic system O2 where white cabbage was grown in bare soil plots showed highest abundance of small predatory beetles which are known to consume cabbage root fly eggs.*


*Photo 4 (left): Cabbage with intercropped strips of green manure in the organic system O3 showed the most significant decrease in egg laying by cabbage root flies over the three year study period. Egg numbers were estimated from soil samples collected around the cabbage plant.*

crevices in the soil where the fly eggs are located.

Two to four times as many potential egg predators were caught in system O2 compared to the three other systems during first generation fly activity of both 2007 and 2008. This trend continued in 2008 during second generation flight too (Fig. 1).

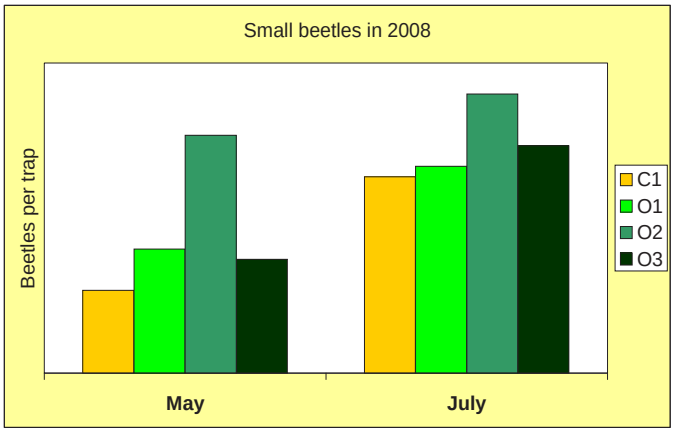



*Figure 1*
*Small (<8 mm) predatory beetles consume the eggs of the cabbage root fly. Small beetle activity was highest in the low input organic system O2*

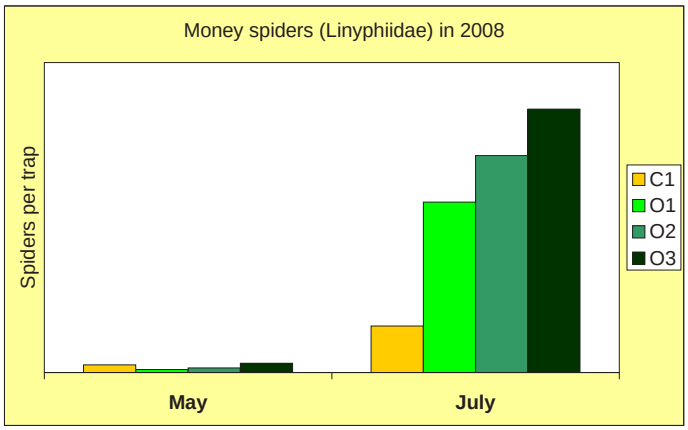



*Figure 2*
*Small money spiders were much more abundant in the three organic systems, O1, O2 and O3, compared to the conventional system C1 in July 2008. These spiders mostly consume aphids.*

Small predatory beetles show increased activity in organic system free of external input, but only in plots with bare soil between crop rows as in O2. The beetles are likely to contribute to an improved regulation of cabbage root flies. However, system O3 - which only differ structurally from O2 by intercropping - did not benefit small beetle activity.

Natural enemies other than small predatory beetles are also affected by the four farming systems. We trapped small money spiders (family Linyphiidae) and larger generalist predators - ground beetles (family Carabidae) and hunting spiders (family Lycosidae) - in the cabbage plots in 2007 and 2008. Both groups responded to the farming systems, but in surprisingly different ways.

Practically no money spiders were present in the cabbage crop in May, but the numbers increased drastically in the organic systems compared to C1 in July (Fig. 2). Three to four times more spiders were trapped in the organic systems than in the conventional C1 in July 2008. The trends actually reflect the increasing level of complexity and thus assumed sustainability of the four farming systems by O1<O2<O3. Money spiders are predators of aphids which also attack cabbage.

Ground beetles and hunting spiders also responded to the farming systems. These predators are normally associated with complex habitats usually absent in arable farmland. Effects were evident in May when significantly more traps contained species of these natural enemies in O3 as compared to the other systems (Table 1). Early in the season, the intercrop in O3 therefore adds faunal elements to the arable farmland.

The organic systems O2 and O3 show similar levels of natural regulation of cabbage root flies but benefit the activity of natural enemies differently. Organic cabbage cropping with low input give no more problems with cabbage root flies than high input systems such as O1. However, O2 benefits the predators associated with fly egg predation while the complexity of O3 benefits predator diversity in general.

**Read more**
You can find more information about the DARCOF III research project VegQure on the webpage:

www.icrofs.org/Pages/Research/darcofIII_vegqure.html

The project is funded by the Danish Ministry of Food, Agriculture and Fisheries

# Organic food and farming: A pro-poor model for smallholder inclusion in developing countries

By Paul Rye Kledal, Institute of Food and Resource Economics
Copenhagen University, Denmark

**In the DARCOF III research project, GlobalOrg, an important socio-economic task is to analyze the prospects of organic food and farming as model for inclusion of small-holder farmers in developing countries into modern value chains. Read more about GlobalOrg in this article.**

With capitalist expansion and the ongoing globalization of markets in relation to trade and foreign direct investments, export-oriented strategies for developing countries as a way to upgrade knowledge and transfer modern technologies has long been a focus area and debated about its pro's and con's. Organic food and farming is part of this globalization process, where global demand for organic products has remained robust, but with sales increasing by over 5 billion US$ a year reaching 46.1 billion US$ in 2007 - more than the triple of 2000.

Most of the sales still take place in the US and Europe (97 per cent), but with a growing commodity import from the countries of the South (ref. 2; http://orgprints.org/15575).

However, with the social and environmental rules inherent in its mode of production- and trade, does the globalization of organic food already hold certain benefits for developing countries as a pro-poor development strategy?

## Analyzing the prospects of organic farming

In the GLOBALORG research project one of the socio-economic questions has been to analyze the prospects of organic food and farming as model for inclusion of small-holder farmers in developing countries into modern value chains – be it for a domestic or an export oriented market. As with many things in research the quick answer is both a yes and no. The more complex answer would be: it depends on… .

One of the major analytic results from GLOBALORG is the typologies of food systems that organic supply chains in developing countries operate within, illustrating the complexity in an answer when asked a simple question.

## Four types of food systems

As illustrated in the figure on next page, there are four different typologies of food systems closely related to the development process taking place in the developing countries, as well as to the parallel growth of organic food commodities.

## Traditional chains

The first is a traditional food system, characterized by a dominance of traditional, unorganized supply chains and limited market infrastructure. Most of the world's poor farmers operate in this food system and struggle here to make a living. The debated term 'organic by default' is generally used about farmers in this food system, due to the fact that most of the farmers are organic in the sense that they do not use pesticides or chemical fertilizers simply because they cannot afford it.

## Alternative organic chains

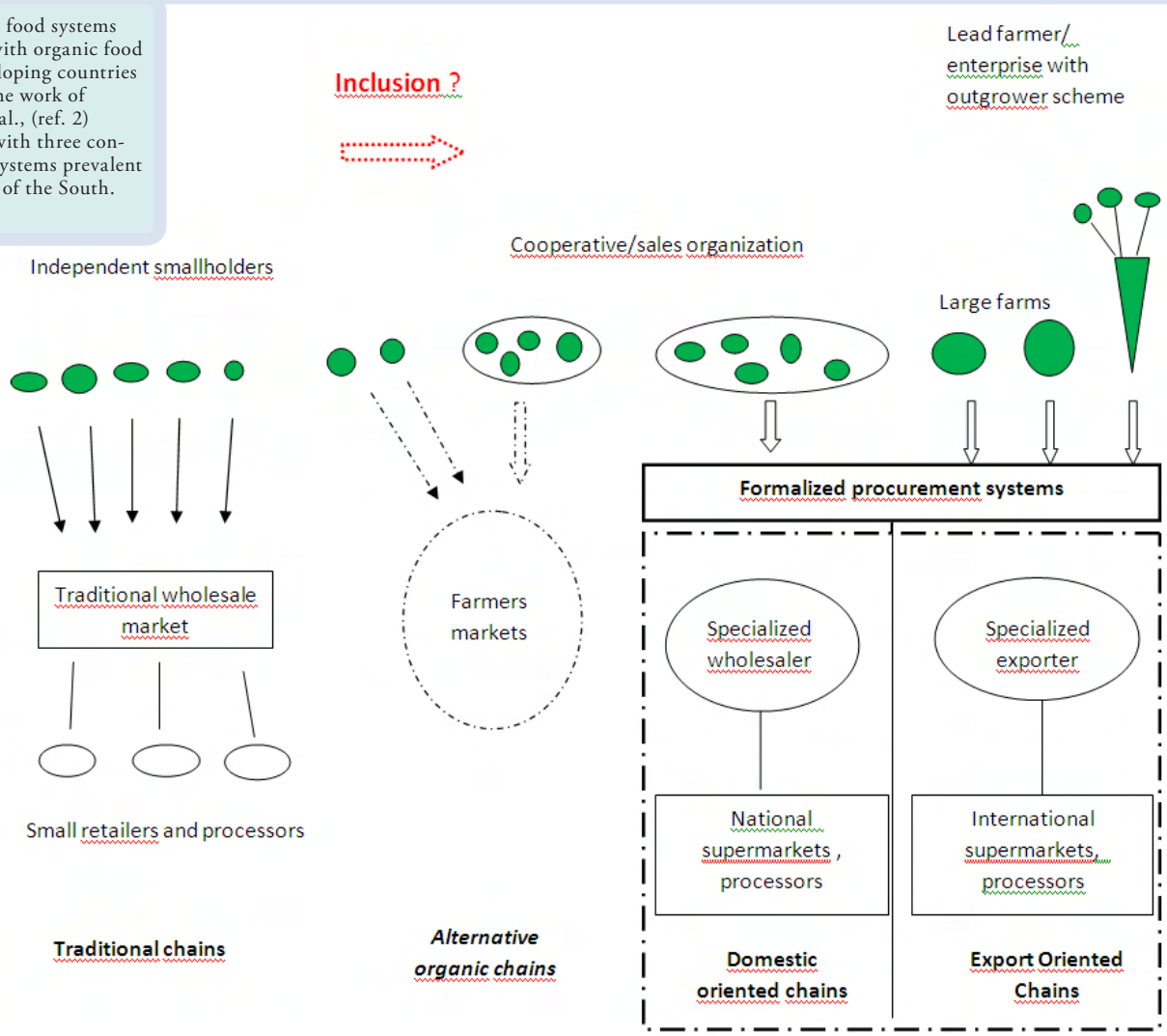
The fourth is named an alternative food system, where farmers, various types of intermediaries and consumers are able to construct semi-closed circuits of exchange. These semi closed circuits are often based on values stressing transactional processes of trust, community, social and environmental welfare as against capitalist transaction outcomes of exchange such as competition, exclusion, price decline and concentration of production. The alternative organic food system is absent in many developing countries, but in countries with a strong and well organized farm movement like in Uganda, Bolivia, Brazil and India this food system prosper well.

## Domestic oriented chains

The second is a more structured food system, still characterized by traditional market actors, but with a more complex set of rules and regulations applied to marketplaces and a higher degree of market infrastructure. Organized supply chains operated by national and/or international supermarkets begin to capture a larger share of the market, but traditional chains are still most common and the fast growing urban domestic market is the driver.

Organic foods in various NIC are expanding through this market, but a major part of the customers are often found to be expatriates working in international corporations and organizations placed around the country's major metropolis like Cairo, Shanghai or Nairobi (ref. 3 and ref. 4).

The idea of four food systems when working with organic food markets in developing countries is building on the work of McCullough et al., (ref. 2) operating only with three conventional food systems prevalent in the countries of the South.




**Export oriented chains**

The third type is an industrialized food system, as found throughout the developed world, with strong perceptions of food safety, a high degree of coordination, a large and consolidated processing sector and organized retailers. The export market is driven by this food system. The growth of organic production in the developing world is first and foremost linked to this food system.

As illustrated in the above figure, the main focus in market-oriented pro-poor development strategies is how to include smallholders into the other three food systems. However, each food systems carries very specific requirements in terms of volume, quality, and packaging and hence influences not only the type the agro-ecological food system involved, but also which type of farmers are more eligible for inclusion than others into the various value chains. One specific requirement when operating within the formalized procurement food systems is the necessity of delivering the 'critical mass of supply'. If famers cannot deliver the right volume they are excluded. Supermarkets do not want to carry the high transaction cost of dealing with thousands of smallholders to secure the necessary volume. Smallholders therefore have to be organized in a farm association/ cooperative, or they can be contract farms supplying a lead farmer delivering directly to the supermarket if they are to be included into the formalized procurement systems.

Pro-poor livelihood strategies, focusing on organic production and supply as a way to upgrade and transfer knowledge and technology into modern market based value chains, therefore has to take into serious consideration, what food system are the smallholders to be included into, the level of social capital among the smallholders involved as well as the requirements of a supporting resource environment in terms of finance and education if a minimum of success is to be secured.

## About GlobalOrg

GlobalOrg focuses on the social and environmental impact from globalization on smallholders and their benefits of converting to organic production.

Read more at the webpage: www.icrofs.org/Pages/Research/darcofIII_globalorg.html

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**3.** Kledal, P. R.et al. (2009): *Organic Food and Farming in Kenya. In The World of Organic Agriculture – statistics and emerging trends* 2009 IFOAM, Bonn and Fibl, Switzerland.

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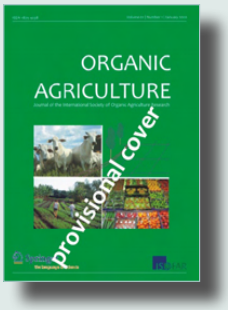
The project is funded by the Danish Ministry of Food, Agriculture and Fisheries

## Publications

### New journal: Organic Agriculture - Call for papers




A new international *peer-reviewed* periodical will be issued in 2010.

The journal, *Organic Agriculture*, is issued by Springer Publishing in the staging of ISOFAR.

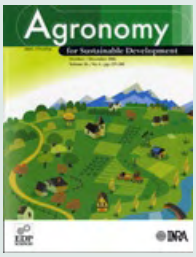
It is the International Society for Research in Organic Agriculture calling for papers for the first issue of the novel journal.

*Organic Agriculture* will constitute a new platform for the sharing of knowledge within the many cross-disciplinary areas of organic agriculture and food systems.

Lines of direction for future autors can be found on Springers' homepage:
www.springer.com/13165

### Call for review articles: Book series - Sustainable Agriculture

[Vol. 2 2010: 2nd call]




The Journal Agronomy for Sustainable Development (ASD) will publish a book series antitled Sustainable Agriculture. The journal's Editor-in-Chief writes:

"After the success of the first volume published in collaboration with Springer we are actually seeking high quality review articles covering all topics of Sustainable Agriculture and Agroecology for the second volume. Please note the following points:

- Pre-submission of a tentative title is open now."

***Submission deadline is June 1, 2010.***

More infromation is available at :
www.agronomy-journal.org/doc_journal/doc/agro/call_2010.pdf

## Congresses

### NJF seminar: Climate Change and Agricultural Production in the Baltic Sea Region

[4-6. May 2010, Sweden]

Focus on Effect, Vulnerability and Adaptation.

The Nordic Association of Agricultural Scientists, NJF, holds a 3-days seminar in May in Sweden.

Climate change will affect agriculture in the Baltic Sea Region in many ways. The expected warmer climate in Northern Europe will have an influence on crop production, animal husbandry and health as well as on the natural flora and fauna.

The scientific program of the conference is open to all fields dealing with effects of climate change on agriculture and animal husbandry including reindeer production. Main topics include

- Climate change scenarios, Crop production
- Crop protection, new pests and diseases and risk assessments
- Animal husbandry
- Animal health, new diseases and risk assessments
- Economy and policy, research and research cooperation.

More information is found at NJF's website: www.njf.nu

### Organic Horticulture (28th IHC): Productivity and sustainability

[22-27 August 2010, Lisbon, Portugal]

*Call for abstracts, deadline: 31.12.2009.*

The 28th International Horticultural Congress (28thIHC) calls for papers is a world conference on horticultural sciences, under the patronage of the International Society for Horticultural Science (ISHS) and will be held in Lisbon, Portugal, at 22-27 August, 2010.

The 28thIHC programme includes the relevant and opportune event considering the rising consumption, production and marketing of organic food, all over the world.

For further information, go to
www.ihc2010.org

## Congresses

### *Greening Human Capital:* International Conference on Human Capital for Sustainable Economics

[27-28 May 2010, Karlsruhe, Germany]

A two-day International Conference on Developing Human Capital for Sustainable Economies is held in the "green" city of Karlsruhe, Germany. Here, a diverse group of participants will discuss issues of global warming and the emergence of the green economies; how is the transformation from high to low carbon economies impacting human capital management; and effective initiatives needed to develop and manage human capital for sustainable economies.

For further information and registration, go to:
www.etechgermany.com/HCConference.pdf

### 1st UNAAB International Summer School on Organic Agriculture

[13-24 September 2010, Abeokuta, Nigeria]

The Organic Agriculture Project in Tertiary Institutions in Nigeria (OAPTIN) was founded in 2004 in response to the global quest for the development of holistsic and sustainable agricultural systems. In response to demand, the University of Agriculture, Abeokuta, Nigeria (UNAAB) holds a summer school in September. Its focus is capacity building, skill and technology development in organic agriculture.

The summer school is designed to give opportunity for sound training in organic agriculture for scientists, farmers, businessmen, and policy makers.

Read the first announcement and summer school programme (jpg):
www.icrofs.org/foto/images/2010_summer_school_nigeria.jpg